Audio Note

IO LIMITED

MOVING COIL CARTRIDGE AND
POWER SUPPLY

OWNER'S INFORMATION

Audio Note

CONTENTS

1) IMPORTANT SAFETY INFORMATION

2) CE DECLARATION OF CONFORMITY
DISPOSAL
POWER REQUIREMENTS

3) INTRODUCTION

4) OVERVIEW
UNPACKING AND INSTALLATION

5) VALVE INSTALLATION

6) CONNECTION

7) OPERATION

8) TECHNICAL SPECIFICATIONS

9) WARRANTY INFORMATION

10) CONTACT INFORMATION

! IMPORTANT SAFETY INFORMATION !

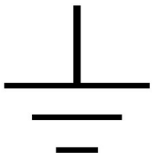
RISK OF SHOCK OR ELECTROCUTION! INTERNAL OPERATING VOLTAGES ARE LETHAL!

Do not remove top cover, unless specifically instructed to do so in the user manual.

This unit contains fuses and other safety components in accordance with BS60065 requirements.
In the event of failure, replacement fuse or safety component must be of the same part type and value.

SUCH REPLACEMENT MUST ONLY BE CARRIED OUT BY A QUALIFIED SERVICE TECHNICIAN.

Do not attempt to replace any fuses without first disconnecting the unit from the mains electricity supply.



This product must be earthed – ensure that the mains supply cable earth / ground is correctly connected.

This product generates high levels of heat. Adequate ventilation must be provided. Do not restrict airflow through any ventilation slots or place the unit on any surface that may restrict airflow.

Valve equipment operates at extremely high temperatures;
KEEP OUT OF THE REACH OF CHILDREN AND ANIMALS.

Do not store or operate this unit in areas of high humidity or in close proximity to water / moisture.

Do not expose or immerse the unit in liquid of any kind.

OTHER SAFETY PRECAUTIONS: -

Never touch the power cord with wet hands.

Always remove the power cord by grasping the plug, not the cable.

Never expose the unit to excessive heat or magnetism.

Never let an inexperienced person repair or reassemble the unit.

Never put anything, especially metal objects, inside the unit.

Never place excessive weight on the unit.

CE DECLARATION OF CONFORMITY

We declare under our sole responsibility that this product is in conformity with the following standards or standardized documents:

BS EN 60065 in accordance with the regulations 73/23/EEC, 89/336/EEC (from 1 January 1997)

CE 94

Peter Qvortrup,
Director
Audio Note (UK) Limited
25 Montefiore Road
Hove
East Sussex
BN3 1RD
United Kingdom

Tel: +44 (0)1273 220 511
Fax: +44 (0)1273 731 498

DISPOSAL

This product must not be disposed of as normal household waste. To prevent possible harm to the environment please separate the product from other waste to ensure that it can be recycled in an environmentally safe manner. Please contact your retailer or the appropriate local government office for collection facilities.

POWER REQUIREMENTS

Power requirements for electrical equipment vary depending on your geographical location. Please ensure that your unit meets the power requirements in your area. The power requirement for your unit is marked on the serial number plate, located on the rear panel.

If you are in doubt, please contact your dealer before plugging the unit into the mains supply.

INTRODUCTION

Thank you for purchasing this Audio Note (UK) product. With the correct care it should give you many years of pleasure and enjoyment.

Please take the time to read all of the information in this manual before connecting your new component to an electrical supply or your system, to ensure both your safety and satisfaction.

Please note that due to our desire to continually improve products, specifications are subject to change without notice. Therefore it is important to refer to the manual that is supplied with your product for the most accurate information; manuals downloaded from our website or obtained from other sources may no longer fully apply to your product.

If you have any questions regarding the information contained within this document or your new component, please feel free to contact us: -

Audio Note (UK) Limited
25 Montefiore Road
Hove
East Sussex
BN3 1RD
United Kingdom

Tel: +44 (0)1273 220 511
Fax: +44 (0)1273 731 498
e-mail: info@audionote.co.uk

Audio Note

IO LIMITED MOVING COIL CARTRIDGE

Congratulations on your purchase of the Audio Note (UK) IO Limited Moving Coil cartridge. It is, without question, the finest and most technically significant Moving Coil cartridge available today. No other cartridge offers such an unparalleled combination of hitherto unknown performance, information retrieval, dynamic contrast, tonal accuracy and sheer musical enjoyment.

Generator Principle

The moving coil principle was chosen as the basis for the design of the IO range of cartridges, as it offers greater linearity in terms of electrical output from the mechanical movements of the stylus than any other system. We investigated moving iron, moving magnet, strain gauge, electret and electrostatic generators, and even took the unusual step of acquiring a Toshiba cartridge that employed light emitting diodes to generate the signal from the groove, but in the end it was felt that the quality of the moving coil system as described by P. G. A. H. Voigt would yield the best overall results.

Mechanical Construction

To ensure that the stored information on the disc is precisely recovered, it is essential that the mechanical movement of the stylus is accurately translated into an electrical signal. Any extraneous excitations arising as a result of vibrations in the cartridge housing must be eliminated.

Therefore in the design of the Audio Note (UK) cartridges considerable attention has been paid to the rigidity and structural integrity of the body, and to ensuring that the adopted mechanical construction stores the absolute minimum of resonant energy, which will degrade the signal derived from the disc being played.

Mechanical integrity of the cartridge body is an aspect of design that has never been adequately dealt with before, and as a result all other cartridges suffer greatly from colourations derived from internal resonances and/or energy stored in their body assemblies.

To achieve the incredible level of mechanical integrity required for the IO cartridges, all aspects of body design were reexamined, to minimize standing waves and eliminate any resonating air pockets within the assembly.

The benefits of getting the mechanical assembly right would be lost if the complete assembly could not be rigidly mounted in the tonearm, hence the incorporation of the largest possible surface mounting area and the provision of up to six (6!) bolts to secure the cartridge to the head shell.

IO LIMITED MOVING COIL CARTRIDGE

Magnetic circuit

Once the mechanical assembly had been perfected the next area to which particular attention was paid was the magnetic circuit.

From numerous tests carried out on a variety of materials and configurations, it was established that different types of magnetic materials exert a subtle influence on the perceived quality of the final sound.

After further extensive research the optimal magnetic circuit was found to be electro magnetically generated. This, however, requires a separate DC power supply and is very costly to implement. Therefore, only a cartridge producing the absolute ultimate in performance could employ such a system… and the IO Limited was born.

Wire Material

Because of the low impedance and very low output of the IO Limited, it is essential that the minimum number of electrical connections occur along the wire and that the wire itself is of the highest possible quality. Not surprisingly we chose our custom made Audio Note (UK) 99.99% pure silver wire, and the coil wire extends all the way to the output terminals, avoiding all unnecessary connections.

Cantilever, Material and Design

It is on the design and construction of the cantilever that much of the quality of a cartridge depends. Many materials were investigated, Boron, Beryllium, Sapphire, Diamond and Titanium and all except Titanium were disregarded in the final analysis, due to deficiencies in one or more areas.
It is vitally important for the cantilever and stylus assembly to be as rigid as possible in order to accurately transfer the stylus motion to the coil assembly, without adding any unwanted vibration as a result of flexing or bending.

The optimum cantilever material here was found to be an extra thick walled, slightly tapered Titanium tube, the taper being both outside AND inside, since this affords by far the greatest rigidity.

Another advantage provided by this type of material was the possibility of employing a longer cantilever, which greatly reduces cantilever excursions. This has three main benefits: -

1) It is easier for the stylus to track complex, highly modulated grooves.

2) The resultant smaller coil movement reduces the nonlinearities in the magnetic field, so the field will ‘bend’ less.

3) Damping can be reduced, as it becomes easier to control stylus movement.

IO LIMITED MOVING COIL CARTRIDGE

Damping

As mentioned above, damping of the cantilever is extremely critical. Too much and the cartridge will sound dull, as a large amount of the critical energy from the record will be absorbed in the damper instead of reaching the coils, reducing the efficiency of the energy transfer from the record (as vibrational energy) to the cartridge (as electrical energy).

Conversely, too little damping will make the cantilever prone to uncontrolled excursions, resulting in unwanted distortions and poor tracking.

Much experimentation led to a precision Butyl rubber damper, offering a wide operating temperature range and minimal hysteresis effects. The tension on the damper is furthermore adjustable, allowing very accurate set-up of each cartridge's individual suspension.

Stylus Choice

Finally the assembly is completed with the use of a solid diamond stylus. A heroic degree of effort has been expended finding the best possible solution to this, the most critical interface with the "plastic". Having been ultimately unsatisfied with the offerings from the various stylus manufacturers around the globe, in 1995 we contracted a company to develop a process which would allow them to cut and polish a perfect, natural octagon to a level of the best surgical instruments used for eye and other fine surgery, on a diamond less than half the size of the closest, readily available option at that time. This remains to the best of our knowledge the finest diamond in use on any cartridge available today.

The improvements over any standard diamonds use in other cartridges can be briefly described as better tracking of high frequencies, lower surface noise, lower record wear, longer stylus life, smaller tip mass and lower tracking force.

The stylus is first 'pinched' into place by the cantilever and then glued, using a single component epoxy resin, which needs 'baking' for about three hours to harden.

Test Procedure

After assembly, each cartridge is subjected to a series of tests, one of which involves a fast dynamic frequency sweep, at high amplitude; this method shows up any undesirable problems in the cartridge. Special test equipment and test records had to be developed for this process, which is exclusive to Audio Note (UK).

UNPACKING AND INSTALLATION

Please take care when unpacking your IO Limited. Choose a clean, clear location to unpack your cartridge. We recommend that you retain and carefully store all of the original packing materials, in case transportation / shipping is required at a later date.

Open the wooden transit box. You will see that the cartridge is mounted on a wooden insert for protection during shipping. The cartridge is supplied with the removable stylus guard installed, and we recommend leaving it in place during the initial installation procedure.

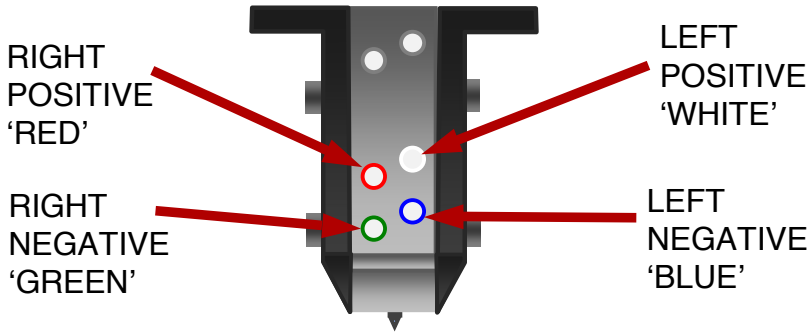
Carefully remove the wooden insert. Underneath, you should find an appropriately sized hex head wrench. Gently hold the cartridge by its side cheeks, and identify the two mounting bolts that secure it to the wooden insert. Carefully remove the two mounting bolts, and once removed, retain these as they can be used to attach the IO Limited to your tonearm heashell.

Once the cartridge, mounting bolts and wrench have been removed, place the transit box and insert to one side. Once installation has been completed, return the wrench to the box and store safely for later use.

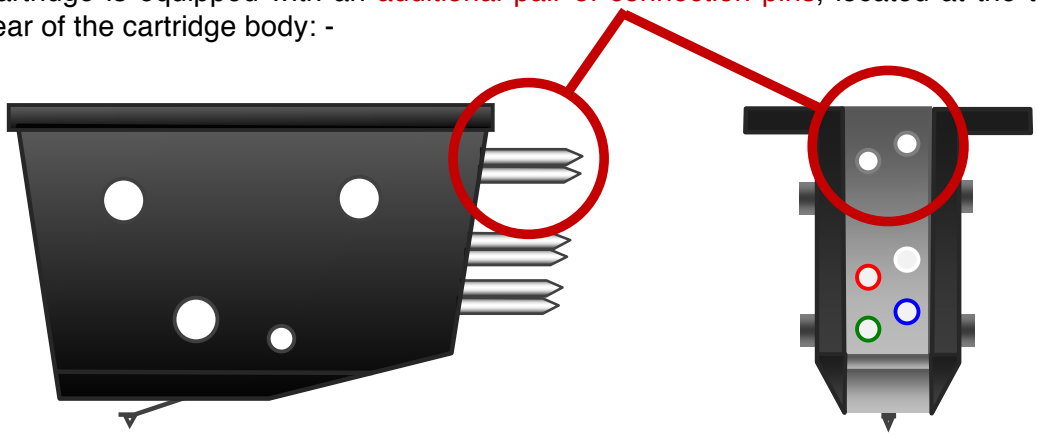
You are now ready to mount your IO Limited in your tonearm's head-shell.

IO LIMITED INSTALLATION

It is often easier to connect the tonearm wires to the connection pins located at the rear of the cartridge body before it is mounted in the head-shell. The pins are colour coded according to the International Standard Colour Code. Connect the four tonearm wires to the corresponding cartridge pins: -



As the IO Ltd is a field coil design, it requires a DC voltage to generate the internal magnetic field. To receive this voltage from the external power supply unit, the cartridge is equipped with an additional pair of connection pins, located at the top / rear of the cartridge body: -



To connect these pins to the external power supply unit, an additional pair of internal (or external) arm wires and a two core / twisted pair external arm cable of suitable length (to reach the external power supply unit) will be required.

PLEASE REMEMBER THAT THE POWER SUPPLY UNIT CONNECTION CABLES MUST BE OF SUITABLE SIZE AND FLEXIBILITY SO THAT THE TRACKING AND OPERATION OF THE TONEARM IS NOT DISRUPTED.

Audio Note (UK) manufacture dedicated versions of their tonearms for the IO Limited, equipped with 6 internal wires and an additional length of external cable from the base of the tonearm. For further information regarding these models, please contact your Audio Note (UK) Dealer, or alternatively please feel free to contact us direct.

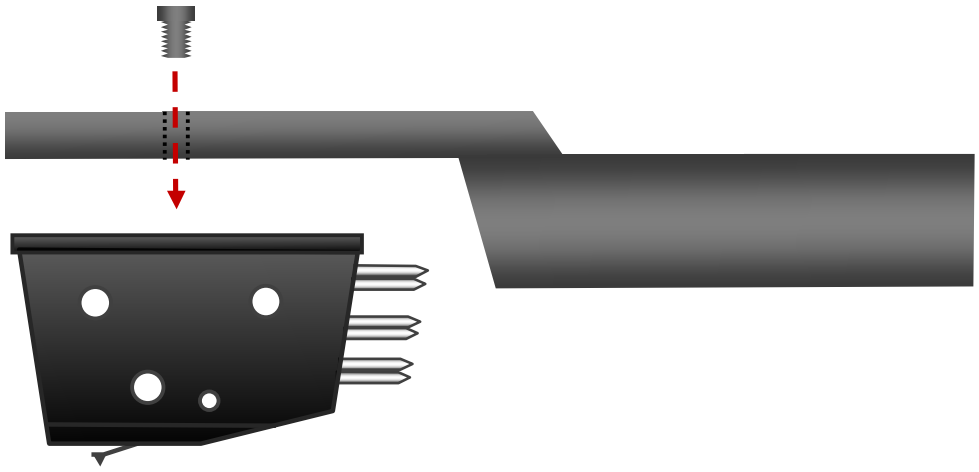
IO LIMITED INSTALLATION continued…

UNDER NO CIRCUMSTANCES SHOULD THE HEAD-SHELL WIRES BE SOLDERED DIRECTLY TO THE CONNECTION PINS OF THE CARTRIDGE BODY. HEAT APPLIED TO THE CONNECTION PINS WILL CAUSE IRREPARABLE DAMAGE.

The cartridge body is equipped with threaded holes, to make the mounting procedure easier and more secure. They are spaced 12.7mm apart, (across the width of the cartridge body) which is the industry standard distance. Additionally, the IO Limited has six threaded mounting holes – three per side – rather than the conventional two; this is to provide the most rigid and secure coupling possible between cartridge and headshell.

A pair of high quality hex head bolts and an appropriately sized wrench are provided for mounting the cartridge body to the head-shell.

Pass the bolts down (from above) through the mounting holes in the head-shell, and align them with the threaded holes in the top surface of the cartridge body.
Gently tighten the bolts to hold the cartridge securely in place. Do not fully tighten the bolts until all cartridge alignment procedures have been completed. (Once all alignment has been finalized, the extra four fixing bolts may be installed if you wish, to maximize the rigidity of the cartridge / headshell interface. Please remember to readjust the tracking weight!).



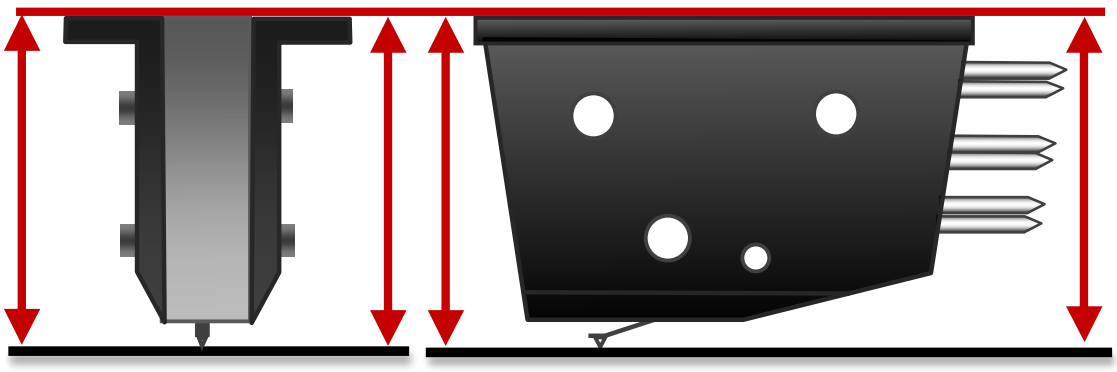
Once the cartridge is in place, set the correct tracking weight. Do this BEFORE the final adjustments are made for cartridge alignment, as this will help to ensure the cantilever is not damaged due to excessive tracking force. Once final alignment adjustments have been made, it will be necessary to check the tracking weight again, as any movement of the cartridge body will change the tracking weight.

The optimum tracking weight for the IO Limited is 2.5g. Remember to remove the clear acrylic stylus guard before setting the tracking weight!

IO LIMITED INSTALLATION continued…

To achieve correct cartridge alignment, it will be necessary to use the alignment protractor provided with your tonearm. If in doubt, contact your tonearm manufacturer, or contact you Audio Note (UK) dealer, who will be able to advise you.

It is also important to make sure that the top surface of the cartridge is mounted parallel to the surface of the record, when viewed from the front and side. These adjustments – referred to as Azimuth and Stylus Rake Angle – will have a noticeable effect on tonal and channel balance, and every effort should be made to accurately adjust these settings.



TOP SURFACE OF CARTRIDGE BODY SHOULD BE PARALLEL WITH RECORD SURFACE, WHEN VIEWED FROM THE FRONT AND SIDE.

Once the final cartridge alignment adjustments have been completed, check the tracking weight again, to ensure that it is correctly set at 2.5g.

You are now ready to enjoy your record collection!

IO LIMITED PSU INITIAL SET UP

WE STRONGLY RECOMMEND THE INITIAL IO LIMITED POWER SUPPLY INSTALLATION AND SET UP SHOULD BE CARRIED OUT BY AN APPOINTED AUDIO NOTE (UK) DEALER.

IRREPARABLE DAMAGE NOT COVERED UNDER WARRANTY MAY BE CAUSED TO THE CARTRIDGE AND POWER SUPPLY BY INCORRECT INITIAL SET UP.

Once all cartridge connections have been made, the operating voltage for the cartridge can be set.

ENSURE THE 'CARTRIDGE' SWITCH IS IN THE 'OFF' POSITION (TURNED ANTICLOCKWISE / LEFT).

Connect the power supply unit to the mains supply, via the IEC socket located on the rear / right of the device. Once connected, turn the unit on using the 'Mains On' switch, located on the right hand side of the front fascia. Turn the switch clockwise / right. The red 'power' LED situated below the 'Mains On' switch should glow RED.

Next, switch on the meter using the 'Meter' switch, located on the lower left hand side of the front fascia. Turn the switch clockwise / right.

At this stage the meter on the front of the power supply unit should show a reading of 1.8V DC – 2.0V DC (divide the value on the meter scale by 10).

Turn the cartridge supply on using the 'Cartridge On' switch, located on the left hand side of the front fascia. Turn the switch clockwise / right.

With an accurate voltmeter set to the 2V DC scale, measure the voltage at the PSU connection pins on the cartridge.

BE EXTREMELY CARFUL, AND DO TOUCH BOTH PINS WITH THE SAME TEST PROBE OR CREATE A SHORT CIRCUIT; THIS WILL POSSIBLY DAMAGE THE CARTRIDGE AND POWER SUPPLY!!

The voltage at the PSU connection pins on the cartridge should be in the region of 1.2V DC to 1.3V DC.

If the voltage is within the required region, proceed to the next section of this manual entitled 'OPERATION'. If it is higher or lower than required, the voltage must be adjusted as follows: -

On the rear of the power supply unit is the cartridge voltage potentiometer. Viewed from the rear of the PSU, turn this switch ANTICLOCKWISE to INCREASE cartridge voltage and CLOCKWISE to DECREASE cartridge voltage.

Check the cartridge voltage again, and repeat the above steps until a voltage of between 1.2V DC and 1.3V DC is achieved.

NEVER SET THE CARTRIDGE VOLTAGE TO GREATER THAN 1.3V DC!

OPERATION

Once the initial power supply unit set up has been completed and the IO Limited has been correctly installed in your tonearm, you are ready to begin operation.

Mains On

This switch is used to turn the Power Supply Unit on, and is located on the right hand side of the front fascia. Turn the switch clockwise / right. The red 'power' LED situated below the 'Mains On' switch should glow RED.

THE POWER SUPPLY UNIT SHOULD BE SWITCHED OFF WHEN NOT IN USE FOR AN EXTENDED PERIOD (MORE THAN A FEW DAYS).

Cartridge On

This switch is used to apply the required voltage to the cartridge. When you wish to use the Io Limited (to play music!), turn the switch clockwise / right. There are two reasons for this switch; firstly, it allows the power supply unit to remain polarized even when the cartridge is not in use (Cartridge On switch in the 'OFF' / anticlockwise position), and secondly, it allows the supply to be disconnected when not in use, which prolongs the life of the Io Limited.

THE CARTRIDGE SHOULD ALWAYS BE SWITCHED OFF WHEN NOT IN USE!

Meter On

Located on the lower left hand side of the front fascia, this switch is used to activate the test meter, positioned on the front of the power supply unit. Turn the switch clockwise / right.

Meter

The meter allows the user to monitor the approximate voltage being supplied to the cartridge. With the cartridge turned on (see **Cartridge On** above) and the meter turned on (see **Meter On** above) the meter should read approximately 1.2 V DC to 1.4 V DC. With the cartridge turned off, the meter will show a higher reading.

IF THE METER SHOWS A READING GREATER THAN 1.2V DC TO 1.4V DC WHEN THE CARTRIDGE IS SWITCHED ON, SWITCH THE POWER SUPPLY UNIT OFF IMMEDIATELY AND CONTACT YOUR AUTHORIZED AUDIO NOTE (UK) DEALER.

OPERATION Continued…

Cleaning

No special maintenance is required for the power supply unit. Use a soft, clean lint free cloth to remove any surface marks from the casework. For finger marks / grease, use a soft, clean lint free cloth, lightly moistened with a solution of warm water and mild detergent. Do not use any alcohol or solvent based cleaning products, as they may damage the finish of the amplifier.

ENSURE THAT THE POWER SUPPLY UNIT IS SWITCHED OFF AND DISCONNECTED FROM THE MAINS ELECTRICITY SUPPLY BEFORE UNDERTAKING ANY CLEANING.

The IO Limited requires no special maintenance or cleaning. Under no circumstances should any liquid or solvent-based cleaning solutions be applied to the diamond or cantilever. Build up of dust of fluff can be gently blown away, and only in very extreme circumstances should a small, soft artist's brush be used to clean the diamond of cantilever, moving the brush, slowly, gently and extremely carefully from back to front, never in the opposite direction or from side to side.

Cartridge Life

The operational life of a cartridge can be affected by a variety of factors, such as frequency of use, ambient temperature, humidity, quality of vinyl being played etc. Our approximate estimates for the lifespan of the IO Limited is within the region of 1000 to 3000 hours, depending on and not limited to the factors mentioned above.

Rebuilding

We offer a very affordable rebuilding service for all Audio Note IO cartridges, should they become damaged or if they have reached the end of their operational life. If you wish to have your IO Limited rebuilt or retipped, please contact us directly: -

Audio Note (UK) Limited
25 Montefiore Road
Hove
East Sussex
BN3 1RD
United Kingdom

Tel: +44 (0)1273 220 511
Fax: +44 (0)1273 731 498
e-mail: info@audionote.co.uk

TECHNICAL SPECIFICATIONS

OUTPUT VOLTAGE	0.04mV / 5cm / sec
INTERNAL IMPEDANCE	1 Ohm
MATCHING IMPEDANCE	3 – 4 Ohms
FREQUENCY RANGE	10 – 50KHz, +/- 2dB (dynamic test)
SEPARATION	Greater than 30dB at 1KHz
COMPLIANCE (TYPICAL)	Horizontal 10 Vertical 15
MAGNETIC FIELD STRENGTH	Electromagnetic 1,200 Gauss
WEIGHT	19g
STYLUS PRESSURE	1.5 – 4g 2.5g optimal
POWER SUPPLY OUTPUT VOLTAGE	0.4A, 1.2V DC
POWER SUPPLY WEIGHT AND DIMENSIONS	300mm(w) x 250mm(d) x 100mm(h) Weight 5Kg
NOTE	Due to Audio Note (UK)'s ongoing research and development program, specifications are subject to change without notice.

WARRANTY INFORMATION

Audio Note (UK) warrants this product to be free from defects in materials and workmanship for two years from the original date of purchase from an appointed Audio Note (UK) dealer, and agrees to cover the cost of parts and associated labour required to correct such defects, subject to terms & conditions.

This Warranty is offered to the first purchaser only.

Any valves supplied with the unit are warranted for three months from the original date of purchase.

If the product fails in normal domestic use and during the Warranty period due to the above described faults or defects, Audio Note (UK) will, at its discretion, repair or replace the item free of charge within a reasonable time once it has been returned to Audio Note (UK) or an appointed Audio Note (UK) dealer or service engineer.

Audio Note (UK) is not liable for any shipping charges incurred whilst transporting the product to or from Audio Note (UK) or an appointed Audio Note (UK) dealer or service engineer, should the item require service or repair during or after the Warranty period.

If the product must be shipped, please use the original packaging materials and include a copy of the original sales receipt along with a note explaining, in as much detail as possible, the problems you are experiencing with the unit.

Only use a reputable Courier Service or Shipping Agent, and ensure that your product is insured during transit.

Any servicing, repairs or modifications not authorized by Audio Note (UK), or carried out by persons other than appointed Audio Note (UK) service engineers will invalidate any warranty.

This Warranty does NOT cover: -

Damage sustained whilst in the possession of a shipping agent, retailer or consumer and not caused as a direct result of defects in materials or workmanship.

Damage caused by normal wear and tear.

Damage or defects caused by abnormal or unreasonable use.

Damage caused by accident, acts of nature, misuse or neglect.

Damage caused by a failure to follow the operating and installation instructions supplied with the product.

Damage caused by improper or careless cleaning.

Audio Note (UK) reserves the right to refuse warranty for any component of which the serial number has been removed, defaced or tampered with.

CONTACT INFORMATION

If in the future your Audio Note (UK) product requires servicing, or if you require technical support or have any questions regarding this or any of our other products, please contact your local Audio Note (UK) dealer.

Alternatively, please feel free to contact us directly: -

Audio Note (UK) Limited
25 Montefiore Road
Hove
East Sussex
BN3 1RD
United Kingdom

Tel: +44 (0)1273 220 511
Fax: +44 (0)1273 731 498
e-mail: info@audionote.co.uk